



Product Specification

M270DAN01.1

AU OPTRONICS CORPORATION

(V) Preliminary Specification

(V) Final Specification

Module	27.0" Color TFT-LCD
Model Name	M270DAN01.1

Customer	Date
_____	_____
Approved by	
_____	_____

Note: This Specification is subject to change without notice.

Approved by	Date
<u>Howard Lee</u>	<u>Jan 10, 2013</u>
Prepared by	Date
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AU Optronics corporation

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Record of Revision

Version	Date	Page	Old description	New Description	Remark
0.0	2012/12/26	All	First version release	-	

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1 Handling Precautions

- 1) Since front polarizer is easily damaged, pay attention not to scratch it.
- 2) Be sure to turn off power supply when inserting or disconnecting from input connector.
- 3) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.
- 4) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.
- 5) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface.
- 6) Since CMOS LSI is used in this module, take care of static electricity and insure human earth when handling.
- 7) Do not open or modify the Module Assembly.
- 8) Do not press the reflector sheet at the back of the module to any directions.
- 9) In case a TFT-LCD Module has to be put back into the packing container slot after once it was taken out from the container, do not press the center of the LED lightbar edge. Otherwise the TFT-LCD Module may be damaged.
- 10) Insert or pull out the interface connector, be sure not to rotate nor tilt it of the TFT-LCD Module.
- 11) Do not twist nor bend the TFT -LCD Module even momentary. It should be taken into consideration that no bending/twisting forces are applied to the TFT-LCD Module from outside. Otherwise the TFT-LCD Module may be damaged.
- 12) Please avoid touching COF position while you are doing mechanical design.
- 13) When storing modules as spares for a long time, the following precaution is necessary:
Store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5°C and 35°C at normal humidity.

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2 General Description

This specification applies to the 27.0 inch wide Color a-Si TFT-LCD Module M270DAN01.1. The display supports the WQHD - 2560(H) x 1440(V) screen format and 1.07B colors (RGB 10-bits). The input interface is 4 channel LVDS and this module doesn't contain an driver board for backlight.

2.1 Display Characteristics

The following items are characteristics summary on the table under 25℃ condition:

ITEMS	Unit	SPECIFICATIONS
Screen Diagonal	[mm]	684.7 (27.0")
Active Area	[mm]	596.7 (H) x 335.6 (V)
Pixels H x V	-	2560(x3) x 1440
Pixel Pitch	[um]	233.1 (per one triad) ×233.1
Pixel Arrangement	-	R.G.B. Vertical Stripe
Display Mode	-	Normally Black
White Luminance (Center)	[cd/m ²]	350 cd/m ² (Typ.)
Contrast Ratio	-	1000 (Typ.)
Response Time	[msec]	12ms (Typ., G/G)
Power Consumption (LCD Module + Backligh unit)	[Watt]	34.8 (Typ.) LCD module : PDD (Typ.)=8 W @ white pattern,Fv=60Hz Backlight unit : P _{BLU} (Typ.) =26.8W @ Is _R =70mA and Is _B =90mA
Weight	[Grams]	TBD
Outline Dimension	[mm]	630(H) × 368.2(V) × 12.45(D) Typ.
Electrical Interface	-	4 channel LVDS
Support Color	-	1.07B colors (RGB 10-bit)
Surface Treatment	-	Anti-Glare, 3H
Temperature Range Operating Storage (Shipping)	[°C] [°C]	0 to +50 -20 to +60
RoHS Compliance	-	RoHS Compliance
TCO Compliance	-	TCO 6.0 Compliance

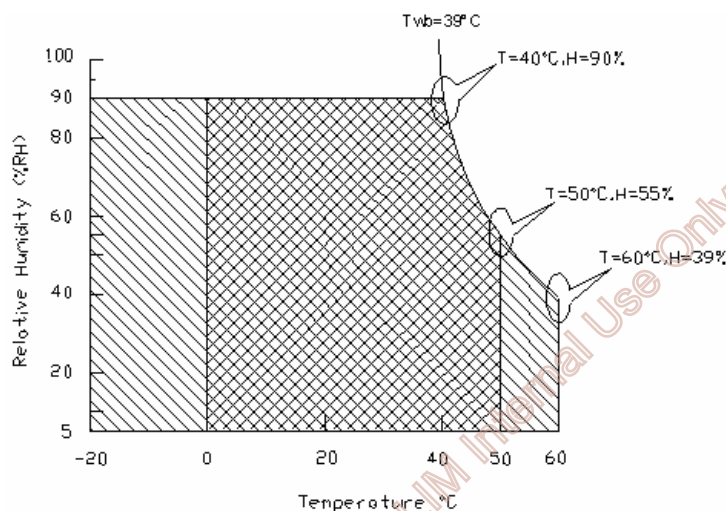
2.2 Absolute Maximum Rating of Environment

Permanent damage may occur if exceeding the following maximum rating.

Symbol	Description	Min.	Max.	Unit	Remark
TOP	Operating Temperature	0	+50	[°C]	Note 2-1
TGS	Glass surface temperature (operation)	0	+65	[°C]	Note 2-1 Function judged only
HOP	Operation Humidity	5	90	[%RH]	Note 2-1
TST	Storage Temperature	-20	+60	[°C]	
HST	Storage Humidity	5	90	[%RH]	

Note 2-1: Temperature and relative humidity range are shown as the below figure.

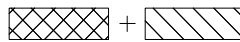
1. 90% RH Max ($T_a \leq 39^\circ\text{C}$)
2. Max wet-bulb temperature at 39°C or less. ($T_a \leq 39^\circ\text{C}$)
3. No condensation



Operating Range



Storage Range



2.3 Optical Characteristics

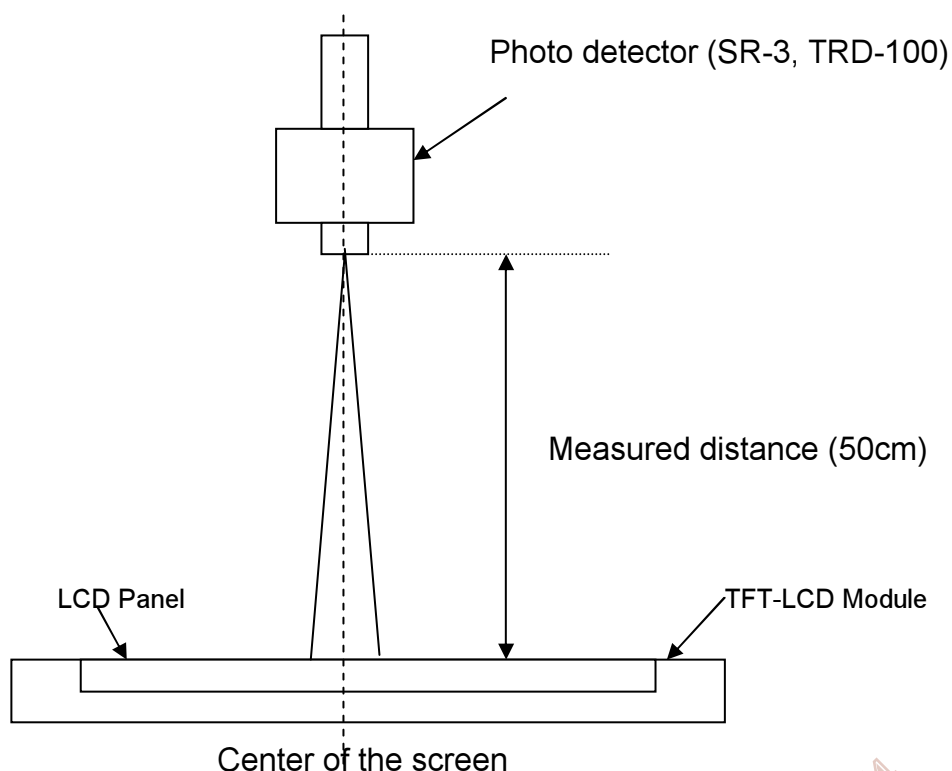
The optical characteristics are measured on the following test condition.

Test Condition:

1. Equipment setup: Please refer to **Note 2-2**.
2. Panel Lighting time: 30 minutes
3. VDD=5.0V, Fv=60Hz, IsR=70mA, IsB=90mA Ta=25°C

Symbol	Description		Min.	Typ.	Max.	Unit	Remark
L _w	White Luminance (Center of screen)		280	350	-	[cd/m ²]	Note 2-2 By SR-3
L _{uni}	Luminance Uniformity (9 points)		75	80	-	[%]	Note 2-3 By SR-3
CR	Contrast Ratio (Center of screen)		600	1000	-	-	Note 2-4 By SR-3
θ _R	Horizontal Viewing Angle (CR=10)	Right	75	89	-	[degree]	Note 2-5 By SR-3
θ _L		Left	75	89	-		
Φ _H	Vertical Viewing Angle (CR=10)	Up	75	89	-		
Φ _L		Down	75	89	-		
θ _R	Horizontal Viewing Angle (CR=5)	Right	75	89	-		
θ _L		Left	75	89	-		
Φ _H	Vertical Viewing Angle (CR=5)	Up	75	89	-		
Φ _L		Down	75	89	-		
-	Response Time (Gray to Gray)	Rising + Falling	-	12	-	[msec]	Note 2-6 By TRD-100
R _x	Color Coordinates (CIE 1931)	Red x	0.664	0.694	0.724	-	By SR-3
R _y		Red y	0.267	0.297	0.327		
G _x		Green x	0.180	0.210	0.240		
G _y		Green y	0.679	0.709	0.739		
B _x		Blue x	0.114	0.144	0.174		
B _y		Blue y	0.032	0.062	0.092		
W _x		White x	0.283	0.313	0.343		
W _y		White y	0.299	0.329	0.359		
CT	Crosstalk		-	-	-	1.5	Note 2-7 By SR-3
F _{dB}	Flicker (Center of screen)		-	-	-20	[dB]	Note 2-8 By SR-3

Note 2-2: Equipment setup :

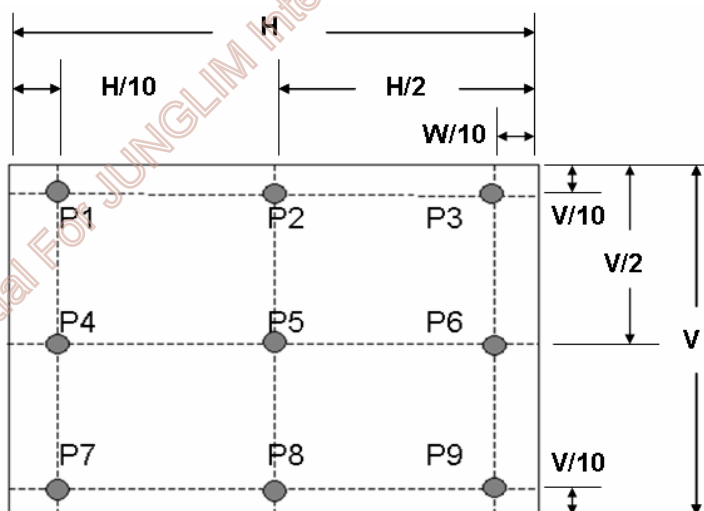


Note 2-3: Luminance Uniformity Measurement

Definition:

$$\text{Luminance Uniformity} = \frac{\text{Minimum Luminance of 9 Points (P1 ~ P9)}}{\text{Maximum Luminance of 9 Points (P1 ~ P9)}}$$

a. Test pattern: White Pattern



Note 2-4: Contrast Ratio Measurement

Definition:

$$\text{Contrast Ratio} = \frac{\text{Luminance of White pattern}}{\text{Luminance of Black pattern}}$$

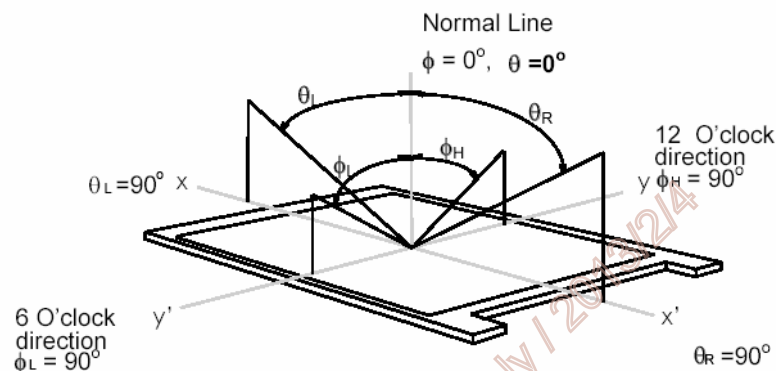
- a. Measured position: Center of screen (P5) & perpendicular to the screen ($\theta = \phi = 0^\circ$)

Note 2-5: Viewing angle measurement

Definition: The angle at which the contrast ratio is greater than 10 & 5 .

- a. Horizontal view angle: Divide to left & right (θ_L & θ_R)

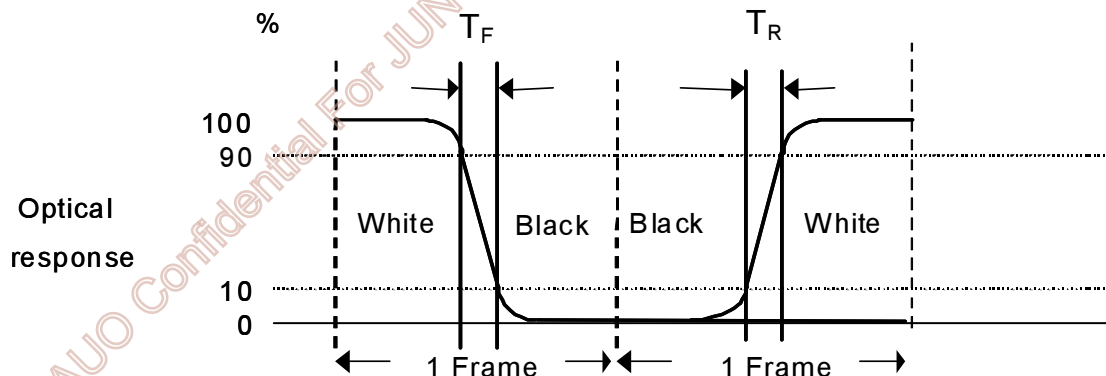
Vertical view angle: Divide to up & down (ϕ_H & ϕ_L)



Note 2-6: Response time measurement

The output signals of photo detector are measured when the input signals are changed from "Black" to "White" (rising time, T_R), and from "White" to "Black" (falling time, T_F), respectively. The response time is interval between the 10% and 90% of optical response.

(Black & White color definition: Please refer section 3.4.3)



The gray to gray response time is defined as the following table. The algorithm is | Gray Level A – Gray Level B | ≥ 256 .

Gray Level to Gray Level		Falling Time				
		G0	G255	G511	G767	G1023
Rising Time	G0					
	G255					
	G511					
	G767					
	G1023					

- T_{GTG_typ} is the total average time at rising time and falling time of gray to gray.
- T_{GTG_max} is the maximum time at rising time or falling time of gray to gray.

Note 2-7: Crosstalk measurement

Definition:

$$CT = \text{Max. } (CT_H, CT_V);$$

Where

a. Maximum Horizontal Crosstalk :

$$CT_H = \text{Max. } (|Y_{BL} - Y_{AL}| / Y_{AL} \times 100 \%, |Y_{BR} - Y_{AR}| / Y_{AR} \times 100 \%);$$

Maximum Vertical Crosstalk:

$$CT_V = \text{Max. } (|Y_{BU} - Y_{AU}| / Y_{AU} \times 100 \%, |Y_{BD} - Y_{AD}| / Y_{AD} \times 100 \%);$$

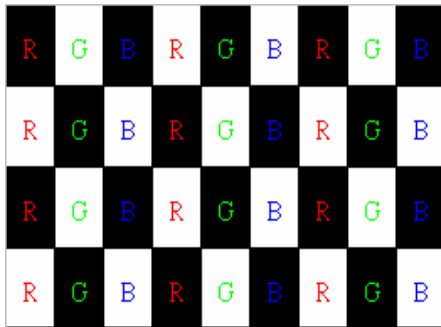
b. $Y_{AU}, Y_{AD}, Y_{AL}, Y_{AR}$ = Luminance of measured location without Black pattern

$Y_{BU}, Y_{BD}, Y_{BL}, Y_{BR}$ = Luminance of measured location with Black pattern



Note 2-8: Flicker measurement

a. Test pattern: It is listed as following.



Gray level = L0



Gray level = L511

R: Red, G: Green, B:Blue

b. Measured position: Center of screen (P5) & perpendicular to the screen ($\theta=\Phi=0^\circ$)

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M270DAN01.1

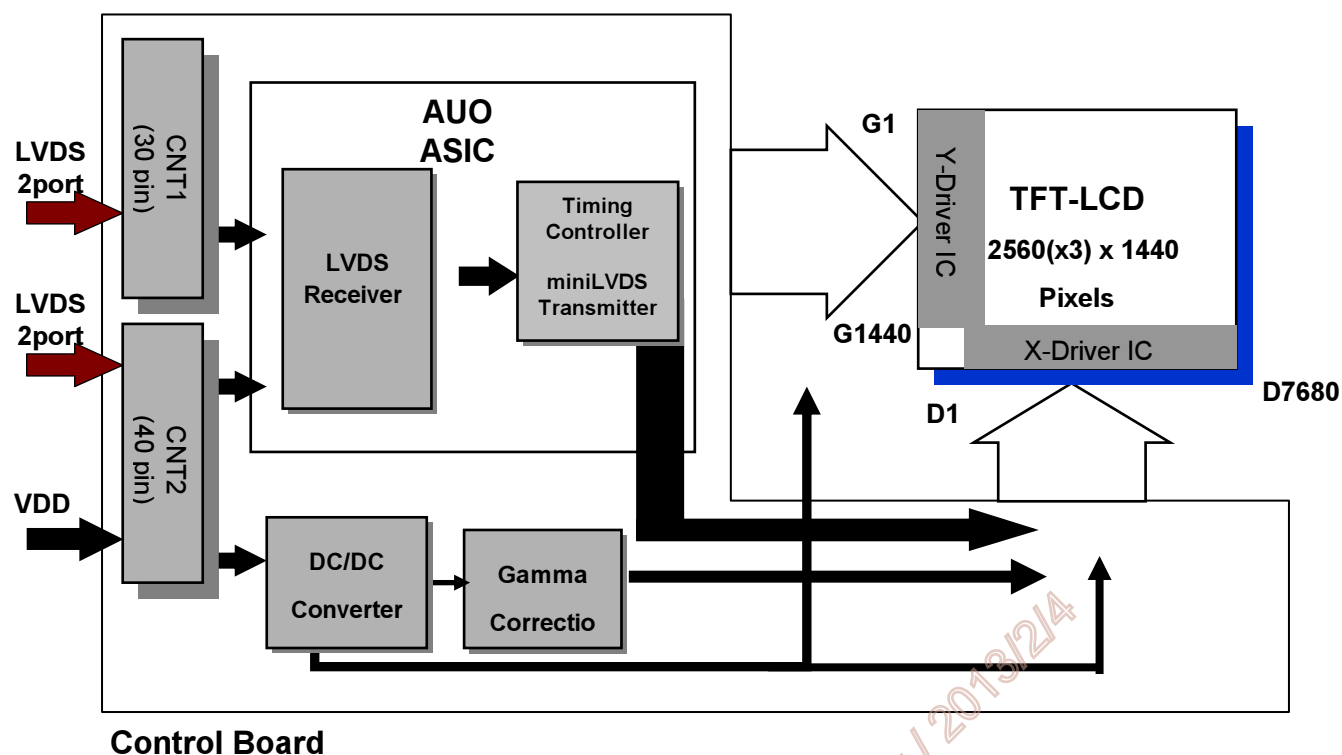
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3 TFT-LCD Module

3.1 Block Diagram

The following shows the block diagram of the 27.0 inch Color TFT-LCD Module.



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3.2 Interface Connection

3.2.1 Connector Type

TFT-LCD Connector (CNT1)	Manufacturer	JAE	STM
	Part Number	FI-XB30SSRL-HF16	MSCK2407P30
TFT-LCD Connector (CNT2)	Manufacturer	STARCONN	-
	Part Number	115F40-R000RA-M3	-
Mating Connector (CNT1)	Manufacturer	JAE	STM
	Part Number	FI-X30HL (Locked Type)	PK2407P30V
Mating Connector (CNT2)	Manufacturer	JAE	
	Part Number	FI-NX40HL	

3.2.2 Connector Pin Assignment

Module Connector - CNT1

PIN #	Signal Name	Description
1	RFO_N0	F path_ Negative LVDS differential data input (Odd data)
2	RFO_P0	F path_ Positive LVDS differential data input (Odd data)
3	RFO_N1	F path_ Negative LVDS differential data input (Odd data)
4	RFO_P1	F path_ Positive LVDS differential data input (Odd data)
5	RFO_N2	F path_ Negative LVDS differential data input (Odd data)
6	RFO_P2	F path_ Positive LVDS differential data input (Odd data)
7	GND	Power Ground
8	RFO_CLKN	F path_ Negative LVDS differential clock input (Odd clock)
9	RFO_CLKP	F path_ Positive LVDS differential clock input (Odd clock)
10	GND	Power Ground
11	RFO_N3	F path_ Negative LVDS differential data input (Odd data)
12	RFO_P3	F path_ Positive LVDS differential data input (Odd data)
13	RFO_N4	F path_ Negative LVDS differential data input (Odd data)
14	RFO_P4	F path_ Positive LVDS differential data input (Odd data)
15	GND	Power Ground
16	RFE_N0	F path_ Negative LVDS differential data input (Even data)
17	RFE_P0	F path_ Positive LVDS differential data input (Even data)
18	RFE_N1	F path_ Negative LVDS differential data input (Even data)
19	RFE_P1	F path_ Positive LVDS differential data input (Even data)
20	RFE_N2	F path_ Negative LVDS differential data input (Even data)
21	RFE_P2	F path_ Positive LVDS differential data input (Even data)
22	GND	Power Ground

23	RFE_CLKN	F path_ Negative LVDS differential clock input (Even clock)
24	RFE_CLKP	F path_ Positive LVDS differential clock input (Even clock)
25	GND	Power Ground
26	RFE_N3	F path_ Negative LVDS differential data input (Even data)
27	RFE_P3	F path_ Positive LVDS differential data input (Even data)
28	RFE_N4	F path_ Negative LVDS differential data input (Even data)
29	RFE_P4	F path_ Positive LVDS differential data input (Even data)
30	GND	Power Ground

Module Connector - CNT2

PIN #	Signal Name	Description
1	RBO_N0	B path_ Negative LVDS differential data input (Odd data)
2	RBO_P0	B path_ Positive LVDS differential data input (Odd data)
3	RBO_N1	B path_ Negative LVDS differential data input (Odd data)
4	RBO_P1	B path_ Positive LVDS differential data input (Odd data)
5	RBO_N2	B path_ Negative LVDS differential data input (Odd data)
6	RBO_P2	B path_ Positive LVDS differential data input (Odd data)
7	GND	Power Ground
8	RBO_CLKN	B path_ Negative LVDS differential clock input (Odd clock)
9	RBO_CLKP	B path_ Positive LVDS differential clock input (Odd clock)
10	GND	Power Ground
11	RBO_N3	B path_ Negative LVDS differential data input (Odd data)
12	RBO_P3	B path_ Positive LVDS differential data input (Odd data)
13	RBO_N4	B path_ Negative LVDS differential data input (Odd data)
14	RBO_P4	B path_ Positive LVDS differential data input (Odd data)
15	GND	Power Ground
16	RBE_N0	B path_ Negative LVDS differential data input (Even data)
17	RBE_P0	B path_ Positive LVDS differential data input (Even data)
18	RBE_N1	B path_ Negative LVDS differential data input (Even data)
19	RBE_P1	B path_ Positive LVDS differential data input (Even data)
20	RBE_N2	B path_ Negative LVDS differential data input (Even data)
21	RBE_P2	B path_ Positive LVDS differential data input (Even data)
22	GND	Power Ground
23	RBE_CLKN	B path_ Negative LVDS differential clock input (Even clock)
24	RBE_CLKP	B path_ Positive LVDS differential clock input (Even clock)
25	GND	Power Ground
26	RBE_N3	B path_ Negative LVDS differential data input (Even data)
27	RBE_P3	B path_ Positive LVDS differential data input (Even data)
28	RBE_N4	B path_ Negative LVDS differential data input (Even data)
29	RBE_P4	B path_ Positive LVDS differential data input (Even data)
30	GND	Power Ground
31	NC	No connection (for AUO test only. Do not connect)
32	NC	No connection (for AUO test only. Do not connect)
33	GND	Power Ground
34	GND	Power Ground

3.3 Electrical Characteristics

3.3.1 Absolute Maximum Rating

Permanent damage may occur if exceeding the following maximum rating.

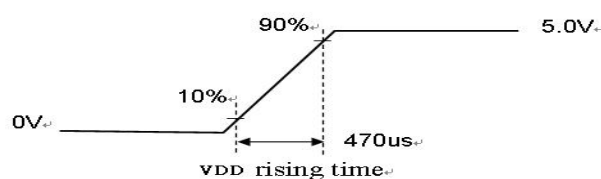
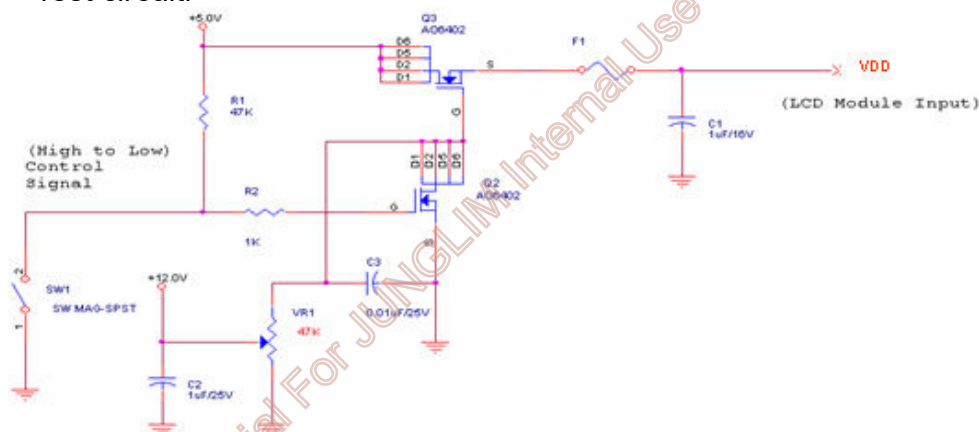
Symbol	Description	Min	Max	Unit	Remark
VDD	Power Supply Input Voltage	GND-0.3	6.0	[Volt]	Ta=25℃

3.3.2 Recommended Operating Condition

Symbol	Description	Min	Typ	Max	Unit	Remark
VDD	Power supply Input voltage	4.5	5.0	5.5	[Volt]	
IDD	Power supply Input Current (RMS)	-	1.6	2.0	[A]	VDD= 5.0V, Black Pattern, Fv=60Hz
			2.0	2.5	[A]	VDD= 5.0V, Black Pattern, Fv=75Hz
PDD	VDD Power Consumption	-	8.0	10.0	[Watt]	VDD= 5.0V, Black Pattern, Fv=60Hz
			10.0	12.5	[Watt]	VDD= 5.0V, Black Pattern, Fv=75Hz
IRush	Inrush Current	-	-	2.0	[A]	Note 3-1
VDDrp	Allowable VDD Ripple Voltage	-	-	500	[mV]	VDD= 5.0V, Black Pattern, Fv=75Hz

Note 3-1: Inrush Current measurement:

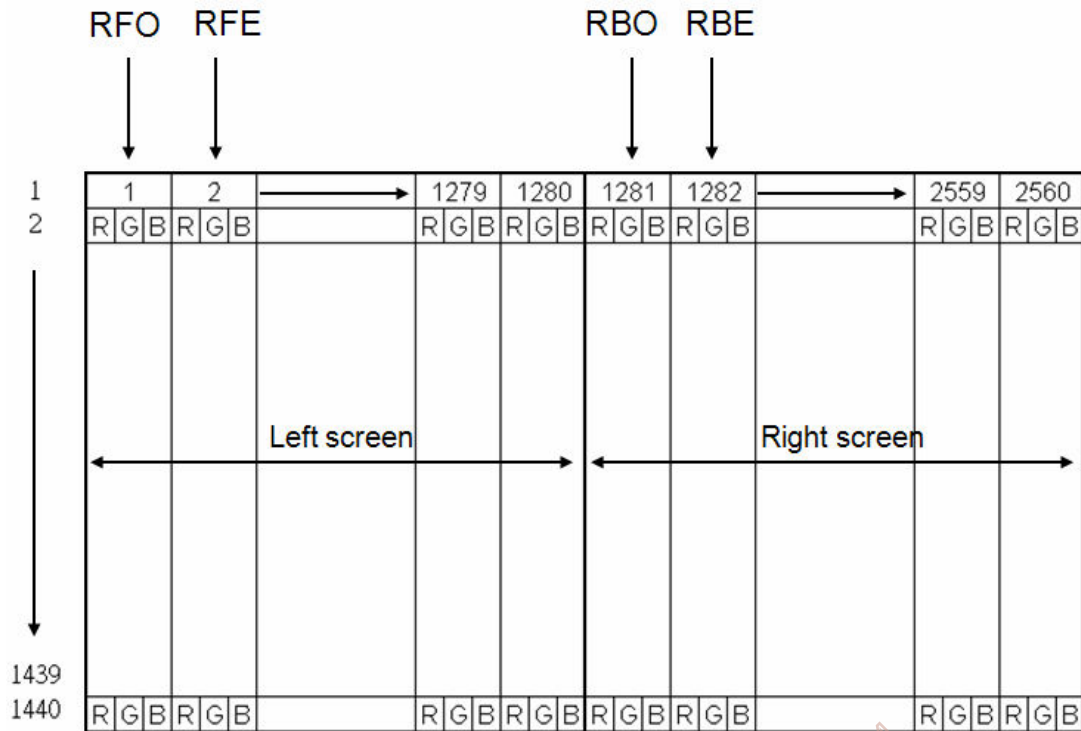
Test circuit:



The duration of VDD rising time: 470us.

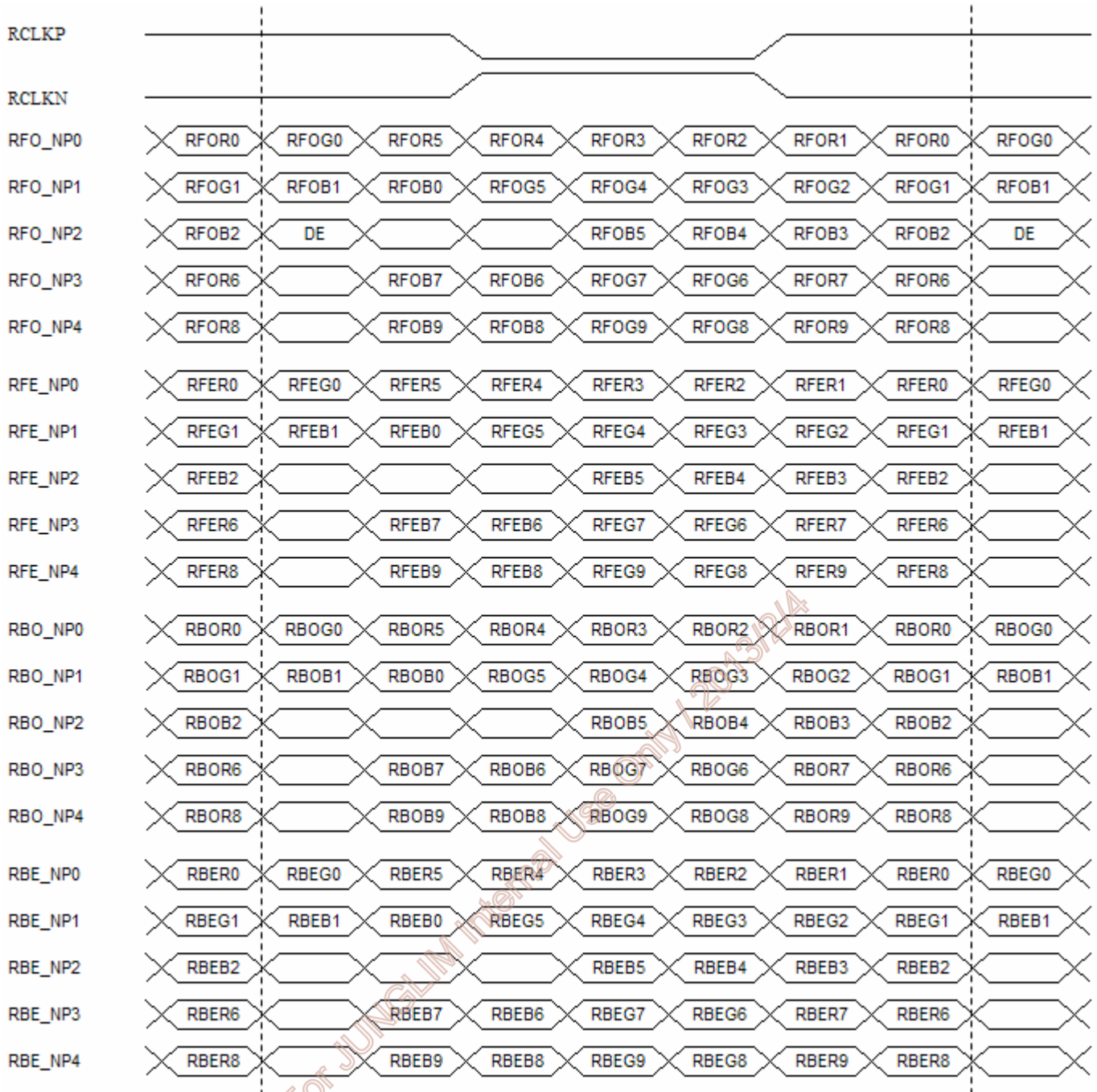
3.4 Signal Characteristics

3.4.1 LCD Pixel Format



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3.4.2 LVDS Data Format



Note 3-2:

- O = "Odd Pixel Data" E = "Even Pixel Data"
- Refer to 3.4.1 the first/third LVDS port (RFO_XX / RBO_XX) transmits odd pixels while the second/fourth LVDS port (RFE_XX / RBE_XX) transmits even pixels and the last data is 2560(even pixel data)

3.4.3 Color versus Input Data

The following table is for color versus input data (10bit). The higher the gray level, the brighter the color.

Color	Gary Level	Color Input Data																														Remark	
		RED data (MSB :R9, LSB :R0)										GREEN data (MSB :G9, LSB :G0)										BLUE data (MSB :B9, LSB :B0)											
		R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	G9	G8	G7	G6	G5	G4	G3	G2	G1	G0	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0		
Black	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
White	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
L511	-	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	
Red	L0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Black	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	L1023	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Green	L0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Black
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	L1023	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	
Blue	L0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Black	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	L1023	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	

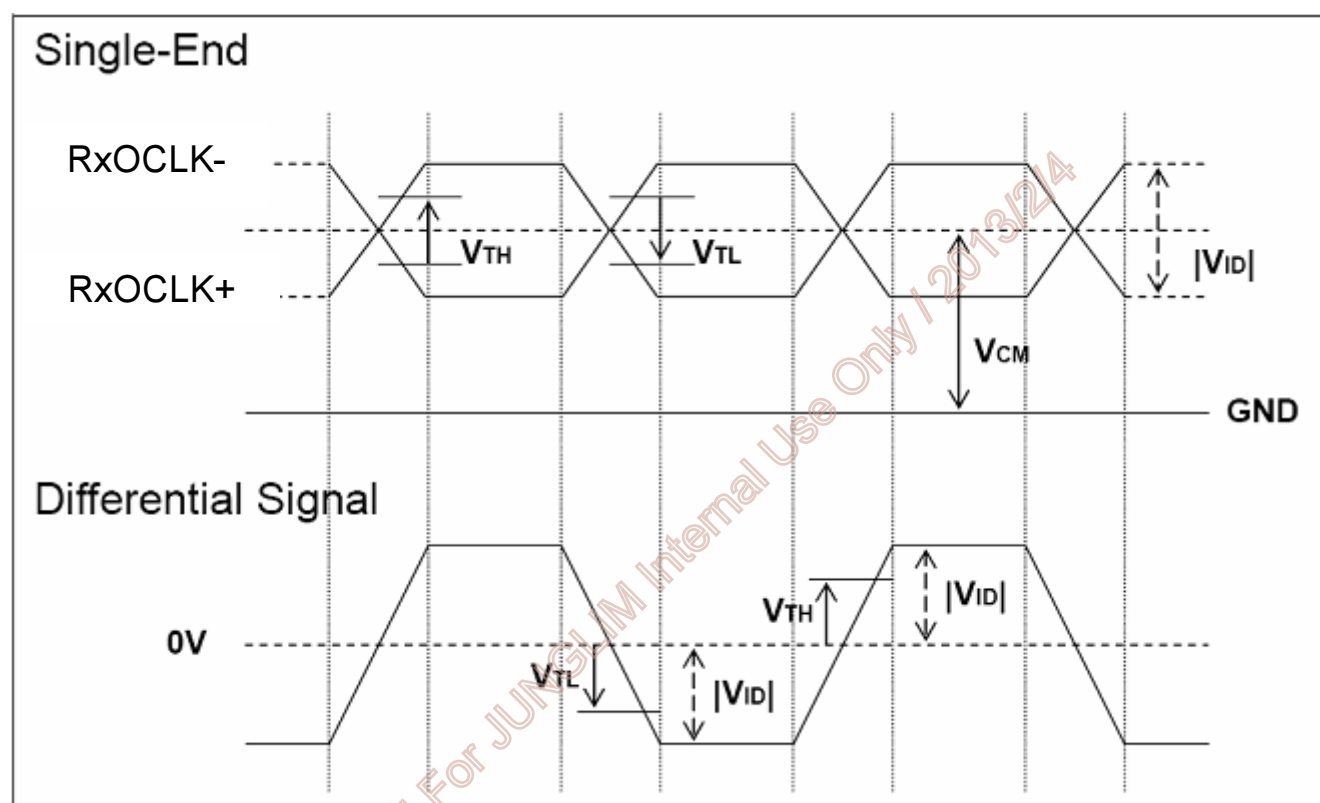
3.4.4 LVDS Specification

a. DC Characteristics:

Symbol	Description	Min	Typ	Max	Units	Condition
V_{TH}	LVDS Differential Input High Threshold	-	-	+100	[mV]	$V_{CM} = 1.2V$
V_{TL}	LVDS Differential Input Low Threshold	-100	-	-	[mV]	$V_{CM} = 1.2V$
$ V_{ID} $	LVDS Differential Input Voltage	100	-	600	[mV]	
V_{CM}	LVDS Common Mode Voltage	+1.0	+1.2	+1.5	[V]	$V_{TH}-V_{TL} = 200mV$

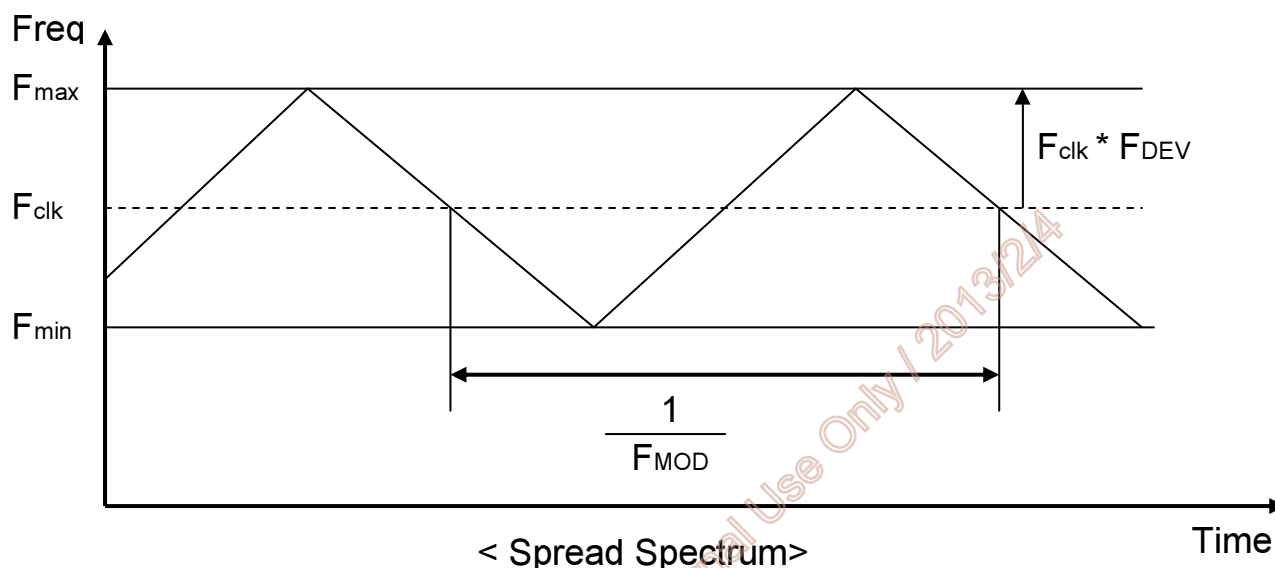
LVDS Signal Waveform:

Use RxOCLK- & RxOCLK+ as example.



b. AC Characteristics:

Symbol	Description	Min	Max	Unit	Remark
F_{DEV}	Maximum deviation of input clock frequency during Spread Spectrum	-	± 3	%	
F_{MOD}	Maximum modulation frequency of input clock during Spread Spectrum	-	200	KHz	



F_{clk} : LVDS Clock Frequency

3.4.5 Input Timing Specification

It only support DE mode, and the input timing are shown as the following table.

Symbol	Description		Min.	Typ.	Max.	Unit	Remark
Tv	Vertical Section	Period	1479	1481	1483	Th	
Tdisp (v)		Active	1440	1440	1440	Th	
Tblk (v)		Blanking	39	41	43	Th	
Fv		Frequency	50	60	75	Hz	
Th	Horizontal Section	Period	676	680	684	Tclk	
Tdisp (h)		Active	640	640	640	Tclk	
Tblk (h)		Blanking	36	40	44	Tclk	
Fh		Frequency	73.9	88.8	111.2	KHz	Note 3-3
Tclk	LVDS Clock	Period	22.22	16.56	13.16	ns	1/Fclk
Fclk		Frequency	45	60.4	76	MHz	Note 3-4

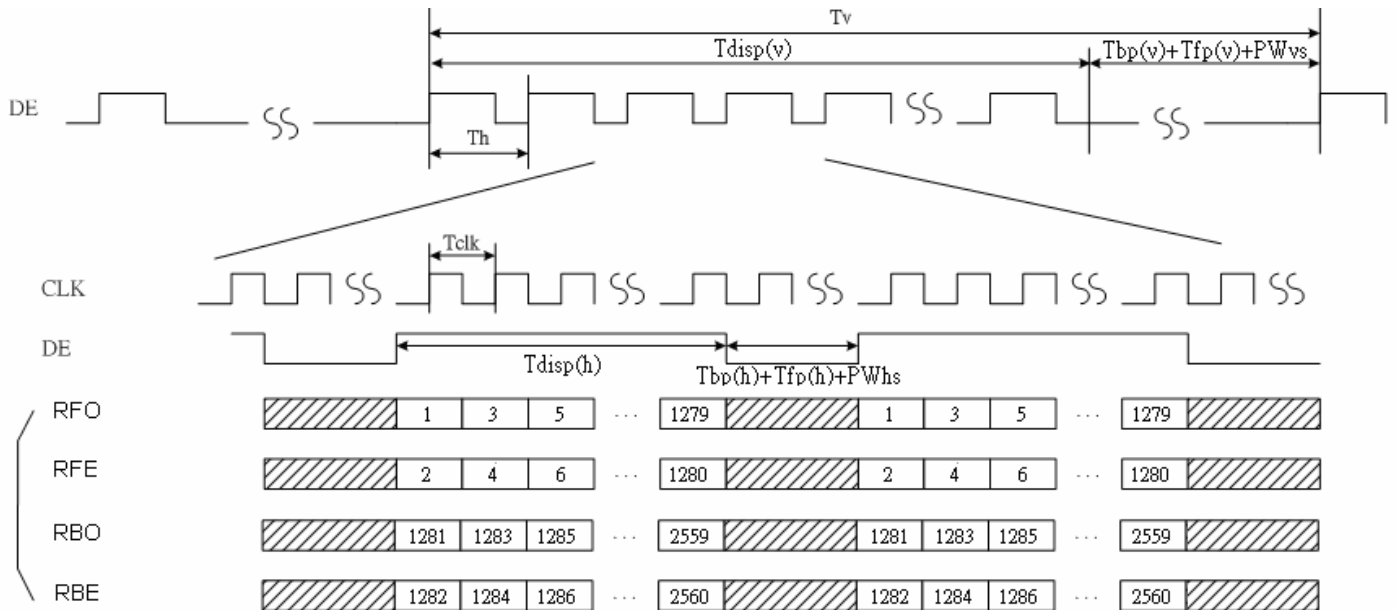
Note 3-3: The equation is listed as following. Please don't exceed the above recommended value.

$$\begin{aligned} Fh (\text{Min.}) &= Fclk (\text{Min.}) / Th (\text{Min.}); \\ Fh (\text{Typ.}) &= Fclk (\text{Typ.}) / Th (\text{Typ.}); \\ Fh (\text{Max.}) &= Fclk (\text{Max.}) / Th (\text{Min.}); \end{aligned}$$

Note 3-4: The equation is listed as following. Please don't exceed the above recommended value.

$$\begin{aligned} Fclk (\text{Min.}) &= Fv (\text{Min.}) \times Th (\text{Min.}) \times Tv (\text{Min.}); \\ Fclk (\text{Typ.}) &= Fv (\text{Typ.}) \times Th (\text{Typ.}) \times Tv (\text{Typ.}); \\ Fclk (\text{Max.}) &= Fv (\text{Max.}) \times Th (\text{Typ.}) \times Tv (\text{Typ.}); \end{aligned}$$

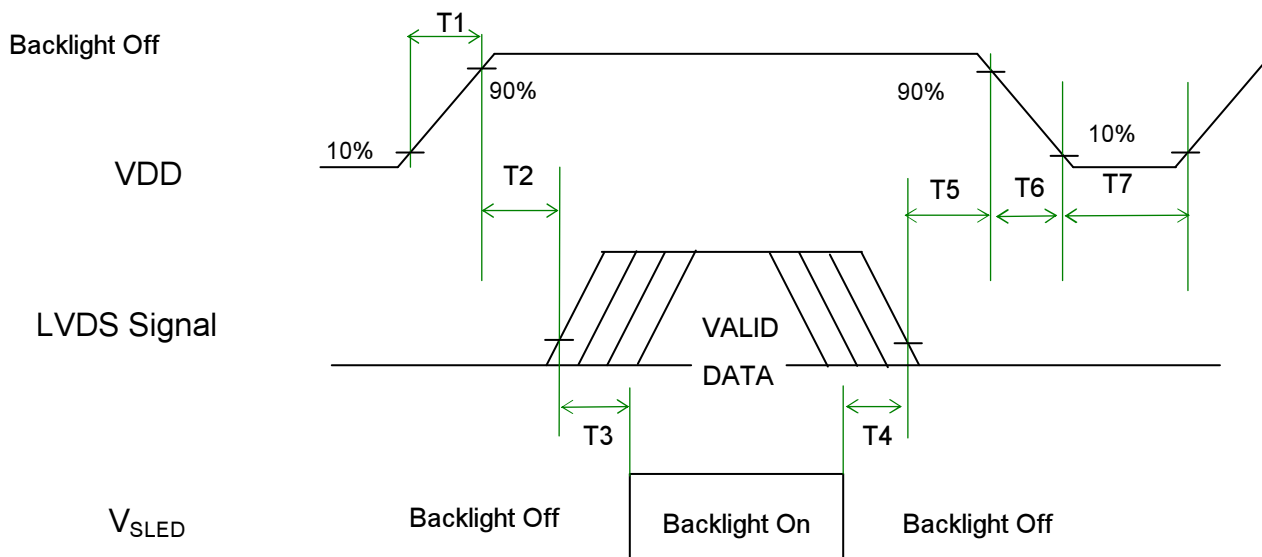
3.4.6 Input Timing Diagram



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3.5 Power ON/OFF Sequence

VDD power, LVDS signal and backlight on/off sequence are as following. LVDS signals from any system shall be Hi-Z state when VDD is off.



Power Sequence Timing

Symbol	Value			Unit	Remark
	Min.	Typ.	Max.		
T1	0.5	-	10	[ms]	
T2	0	-	50	[ms]	
T3	500	-	-	[ms]	
T4	100	-	-	[ms]	
T5	0	-	50	[ms]	Note 3-5 Note 3-6
T6	0	-	150	[ms]	Note 3-6
T7	1000	-	-	[ms]	

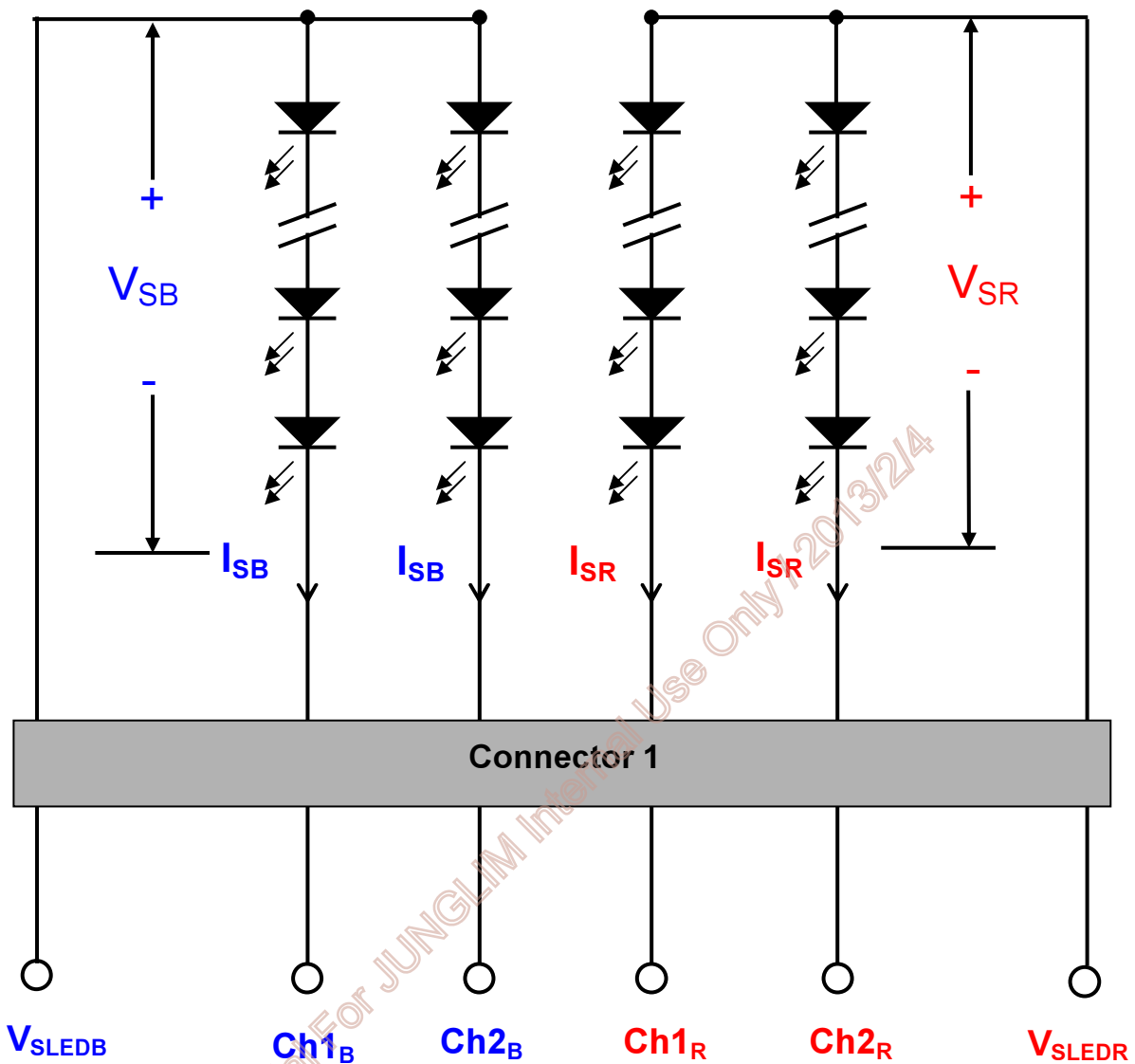
Note 3-5 : Recommend setting T5 = 0ms to avoid electronic noise when VDD is off.

Note 3-6 : During T5 and T6 period , please keep the level of input LVDS signals with Hi-Z state.

4 Backlight Unit

4.1 Block Diagram

The following shows the block diagram of the 27.0 inch Backlight Unit. And it includes 2 pcs LED light bar in Backlight Unit. Each LED light bar includes 30 pcs LED package. (2 strings RED LED chip & 2 strings Blue LED chip in one LED light bar, and 15 pcs LED in one string).



4.2 Interface Connection

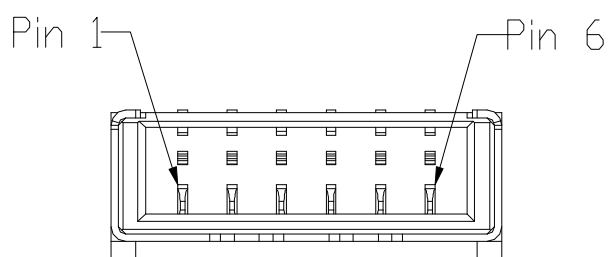
4.2.1 Connector Type

Backlight Connector	Manufacturer	ENTERY
	Part Number	3707K-S06N-21R
Mating Connector	Manufacturer	ENTERY
	Part Number	H112K-P06N-00B (Non-Locking type) H112K-P06N-03B (Locking type)

Backlight Connector dimension:

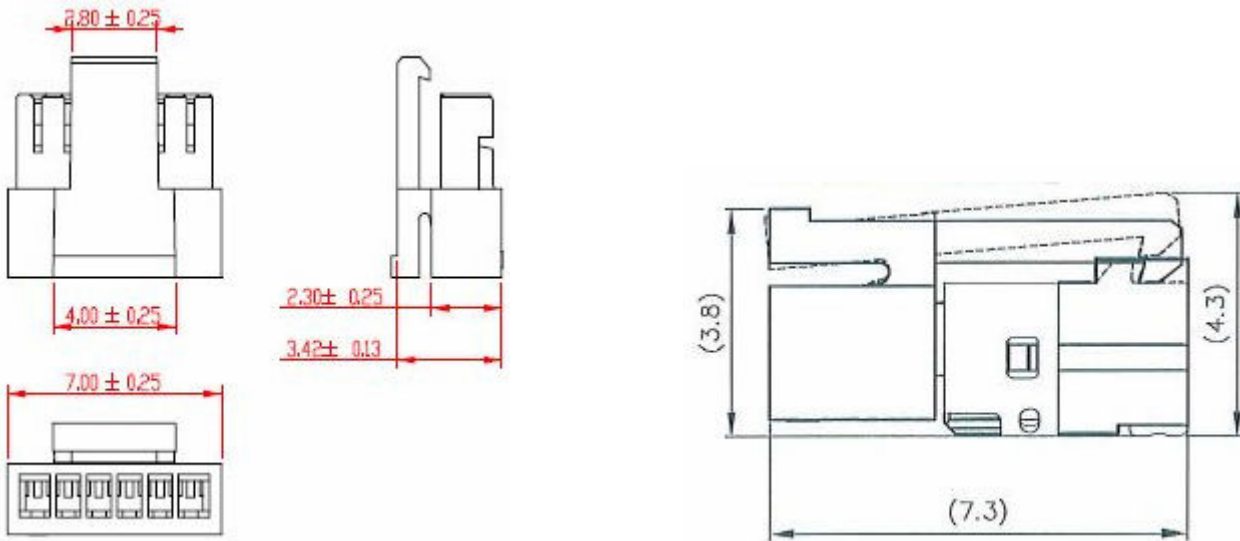
Connector

3707K-S06N-21R



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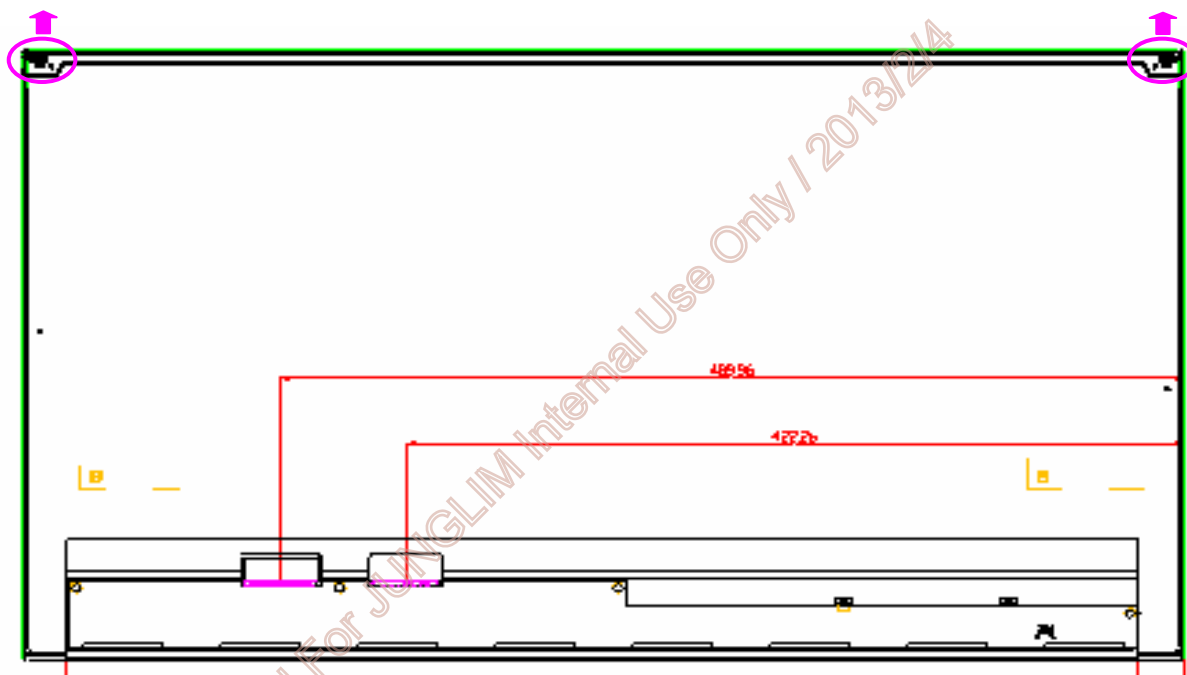
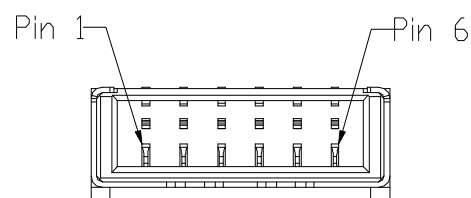
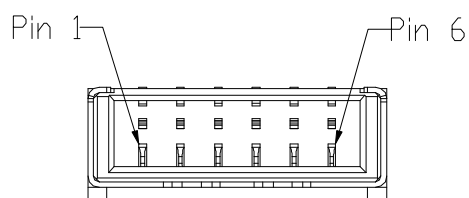
Mating Connector dimension:



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4.2.2 Connector Pin Assignment

Pin#	Symbol	Description	Remark
1	Ch1 _R	Red LED Current Feedback Terminal (Channel 1)	
2	V _{SLEDR}	Red LED Power Supply Voltage Input Terminal	
3	Ch2 _R	Red LED Current Feedback Terminal (Channel 2)	
4	Ch1 _B	Blue LED Current Feedback Terminal (Channel 1)	
5	V _{SLEDB}	Blue LED Power Supply Voltage Input Terminal	
6	Ch2 _B	Blue LED Current Feedback Terminal (Channel 2)	



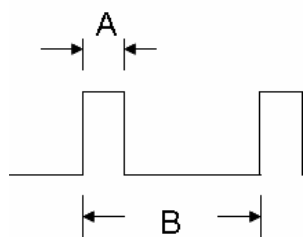
4.3 Electrical Characteristics

4.3.1 Absolute Maximum Rating

Permanent damage may occur if exceeding the following maximum rating.

(Ta=25°C)

Symbol	Description	Min	Max	Unit	Remark
Is _R	LED String Current	0	100	[mA]	100% duty ratio
Is _B	LED String Current	0	160	[mA]	100% duty ratio



Duty ratio= (A / B) X 100% ; (A: Pulse time, B: Period)

4.3.2 Recommended Operating Condition

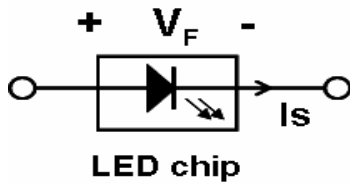
(Ta=25°C)

Symbol	Description	Min.	Typ.	Max.	Unit	Remark
Is _R	R_LED String Current	-	70	77	[mA]	100% duty ratio of LED chip
Is _B	B_LED String Current	-	90	99	[mA]	100% duty ratio of LED chip
Vs _R	R_LED String Voltage	31.5	36	39	[Volt]	Is _R =70mA @ 100% duty ratio; Note 4-1
Vs _B	B_LED String Voltage	42	46.5	51	[Volt]	Is _B =90mA @ 100% duty ratio; Note 4-1
ΔVs _R	Maximum ΔVs _R Voltage Deviation of light bar	-	-	3	[Volt]	Is _R =70mA @ 100% duty ratio; Note 4-2
ΔVs _B	Maximum ΔVs _B Voltage Deviation of light bar	-	-	3	[Volt]	Is _B =90mA @ 100% duty ratio; Note 4-2
P _{BLU}	LED Light Bar Power Consumption	-	26.8	32.2	[Watt]	Note 4-3
LT _{LED}	LED Life Time	30,000	-	-	[Hour]	Note 4-4

Note 4-1: $V_s (\text{Typ.}) = V_F (\text{Typ.}) \times \text{LED No. (one string)}$;

a. V_F : LED chip forward voltage, Blue LED $V_F (\text{Min.})=2.8\text{V}$, $V_F (\text{Typ.})=3.1\text{V}$, $V_F (\text{Max.})=3.4\text{V}$; Red LED $V_F (\text{Min.})=2.1\text{V}$, $V_F (\text{Typ.})=2.4\text{V}$, $V_F (\text{Max.})=2.6\text{V}$

b. The same equation to calculate $V_s (\text{Min.})$ & $V_s (\text{Max.})$ for respective $V_F (\text{Min.})$ & $V_F (\text{Max.})$;



Note 4-2: $\Delta V_s (\text{Max.}) = \Delta V_F \times \text{LED No. (one string)}$;

a. ΔV_F : LED chip forward voltage deviation; (0.2 V , each Bin of LED V_F)

Note 4-3: $P_{BLU} (\text{Typ.}) = [V_{sR} (\text{Typ.}) \times I_{sR} (\text{Typ.}) + V_{sB} (\text{Typ.}) \times I_{sB} (\text{Typ.})] \times 2 \times 2$;

("2" is total Red (or Blue) String No. of single LED Light bar.

"2" is total LED Light bar No. of single Backlight Unit.)

$P_{BLU} (\text{Max.}) = [V_{sR} (\text{Max.}) \times I_{sR} (\text{Max.}) + V_{sB} (\text{Max.}) \times I_{sB} (\text{Max.})] \times 2 \times 2$

Note 4-4: Definition of life time:

a. Brightness of LED becomes to 50% of its original value

b. Test condition: $I_{sR} = 70\text{mA}$, $I_{sB} = 90\text{mA}$ and 25°C (Room Temperature)

5 Reliability Test

AUO reliability test items are listed as following table. (*Bare Panel only*)

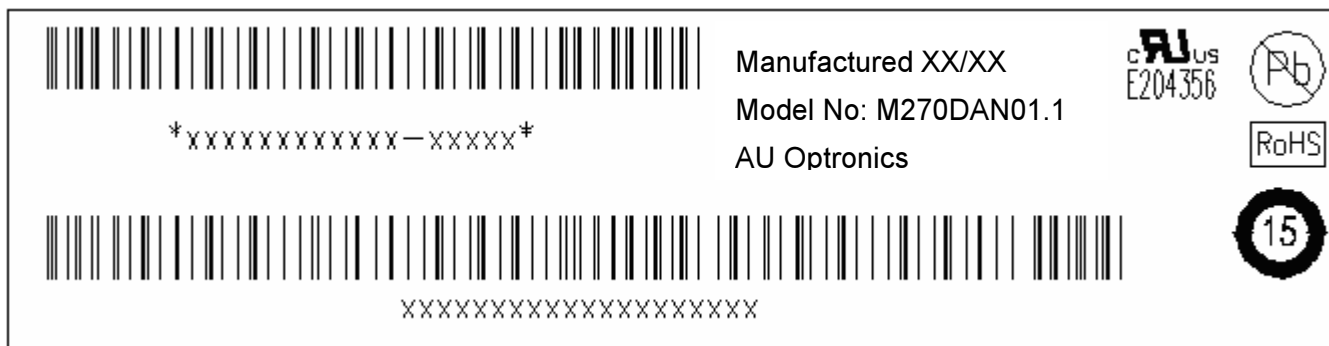
Items	Condition	Remark
Temperature Humidity Bias (THB)	Ta= 50□, 80%RH, 300hours	
High Temperature Operation (HTO)	Ta= 50□, 50%RH, 300hours	
Low Temperature Operation (LTO)	Ta= 0□, 300hours	
High Temperature Storage (HTS)	Ta= 60□, 300hours	
Low Temperature Storage (LTS)	Ta= -20□, 300hours	
Vibration Test (Non-operation)	Acceleration: 1.5 Grms Wave: Random Frequency: 10 - 200 Hz Sweep: 30 Minutes each Axis (X, Y, Z)	
Shock Test (Non-operation)	Acceleration: 50 G Wave: Half-sine Active Time: 20 ms Direction: ±X, ±Y, ±Z (one time for each Axis)	
Drop Test	Height: 60 cm, package test	
Thermal Shock Test (TST)	-20□/30min, 60□/30min, 100 cycles	Note 5-1
On/Off Test	On/10sec, Off/10sec, 30,000 cycles	
ESD (Electro Static Discharge)	Contact Discharge: ± 15KV, 150pF(330Ω) 1sec, 8 points, 25 times/ point.	Note 5-2
	Air Discharge: ± 15KV, 150pF(330Ω) 1sec 8 points, 25 times/ point.	
Altitude Test	Operation: 18,000 ft Non-Operation: 40,000 ft	

Note 5-1: a. A cycle of rapid temperature change consists of varying the temperature from -20□ to 60□, and back again. Power is not applied during the test.
b. After finish temperature cycling, the unit is placed in normal room ambient for at least 4 hours before power on.

Note 5-2: EN61000-4-2, ESD class B: Certain performance degradation allowed
No data lost
Self-recoverable
No hardware failures.

6 Shipping Label

The label is on the panel as shown below:



Note 6-1: For Pb Free products, AUO will add  for identification.

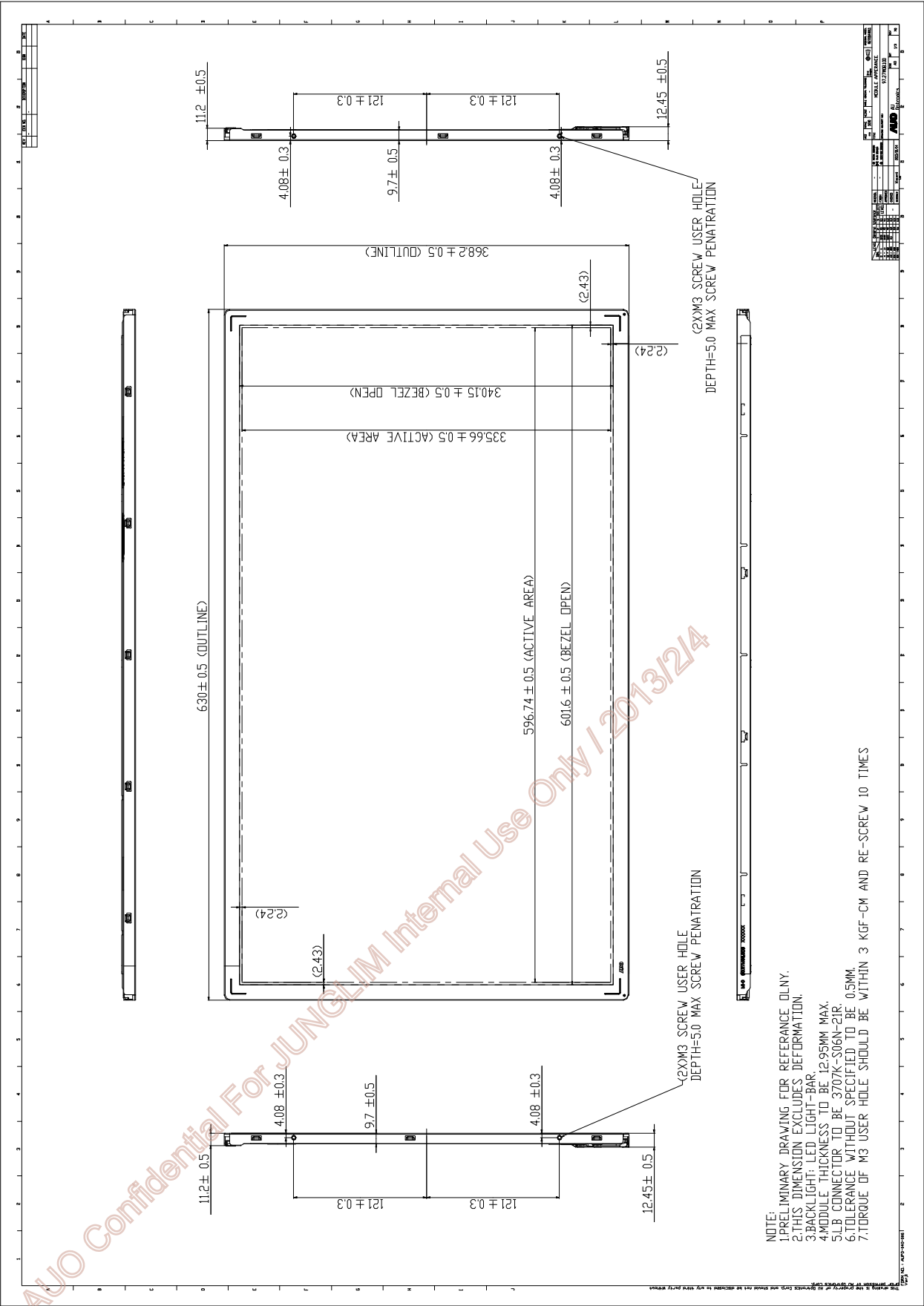
Note 6-2: For RoHS compatible products, AUO will add  for identification.

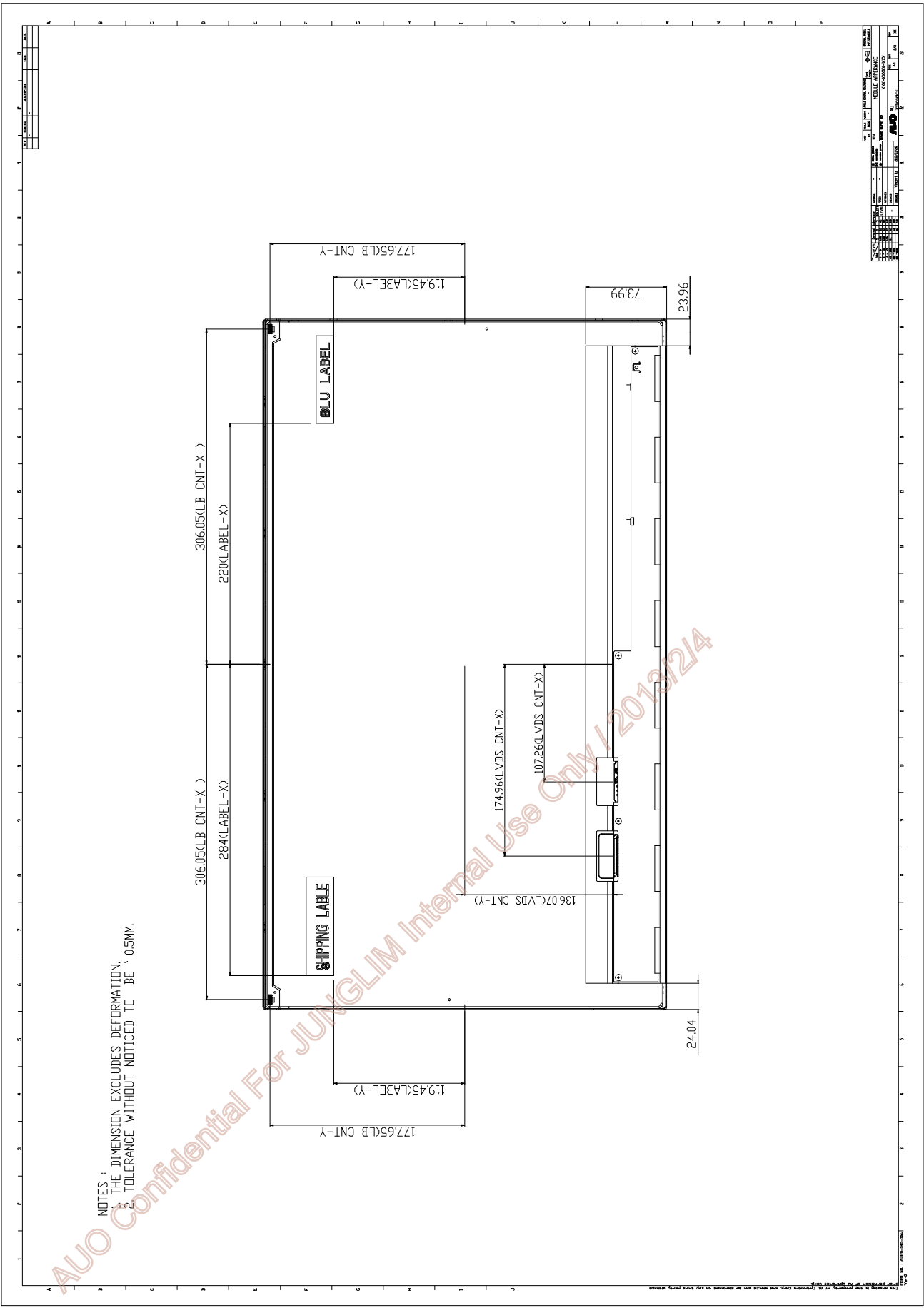
Note 6-3: For China RoHS compatible products, AUO will add  for identification.

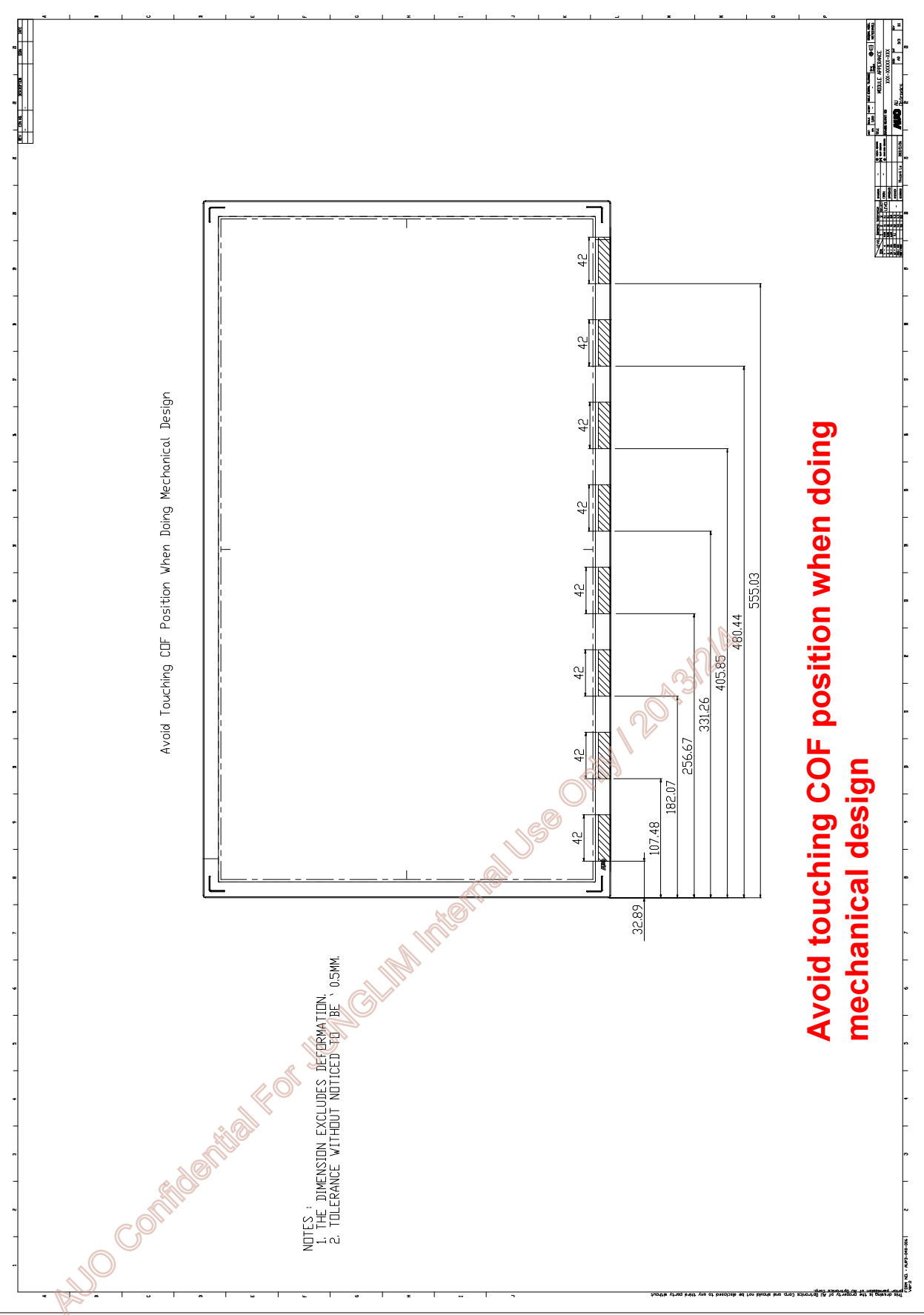
Note 6-4: The Green Mark will be presented only when the green documents have been ready by AUO Internal Green Team.

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7 Mechanical Characteristics

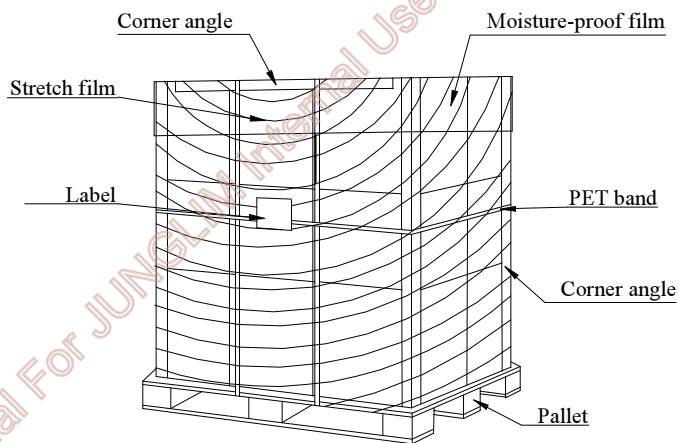
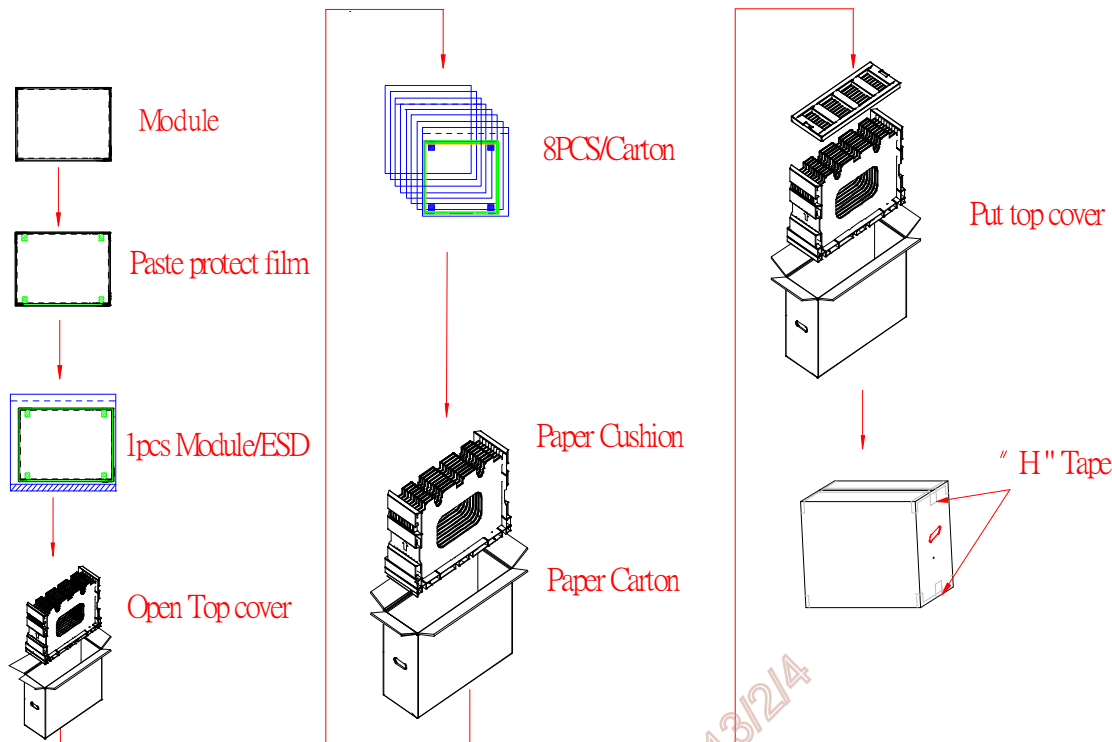






8 Packing Specification

8.1 Packing Flow



8.2 Pallet and shipment information

Item	Specification			Remark
	Q'ty	Dimension	Weight(kg)	
Panel	1	630(H)mm x 368.2(V)mm x 12.45(D)mm	TBD	
Cushion	1	-	4.41	
Box	1	720(L)mm x 264(W)mm x 460(H)mm	1.35	without Panel & cushion
Packing Box	8 pcs/Box	720(L)mm x 264(W)mm x 460(H)mm	TBD	with panel & cushion
Pallet	1	1070(L)mm x 740(W)mm x 138(H)mm	12.9	
Pallet after Packing	8 boxes/pallet	1070(L)mm x 740(W)mm x 1060(H)mm	TBD	

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